CLAIMS

1. An optical disc apparatus for reading out information recorded on an optical disc by irradiating an optical beam on the optical disc, comprising:

a rotation unit operable to rotate the optical disc;

a moving unit operable to move a spot where the optical beam is irradiated on the optical disc in a radius direction of the optical disc;

a linear velocity detection unit operable to detect a linear velocity of the spot;

a rotation control unit operable to control the rotation unit so that the linear velocity detected by the linear velocity detection unit remains substantially constant on an arbitrary radius location on the optical disc, when information recorded on the optical disc is read out; and

a moving time control unit operable to control at least one of the rotation unit and the moving unit so as to prevent the linear velocity detected by the linear velocity detection unit from decreasing to a permissible linear velocity or below, when the moving unit moves the spot.

2. The optical disc apparatus according to Claim 1,

wherein, when moving the spot along the radius direction of the optical disc, the moving time control unit makes a location profile indicating a relation between a radius location and a moving time corresponding to the movement of the spot and controls the moving unit so that the spot is moved along the location profile, and

the moving time control unit revises the location profile so as to prevent the linear velocity from decreasing and controls the moving unit so that the spot is moved along a revised location profile as the linear velocity detected by the linear velocity

detection unit nears to the permissible linear velocity.

3. The optical disc apparatus according to Claim 2,

wherein the rotation control unit makes the rotation unit increase rotation velocity of the optical disc when the moving unit moves the spot from an outer radius to an inner radius of the optical disc, and

the moving time control unit revises the location profile so that a moving velocity of the spot is decreased by the moving unit when the linear velocity detected by the linear velocity detection unit nears to the permissible linear velocity during the movement.

4. The optical disc apparatus according to Claim 2,

wherein the rotation control unit makes the rotation unit decrease the rotation velocity of the optical disc when the moving unit moves the spot from an inner radius to an outer radius of the optical disc, and

the moving time control unit revises the location profile so that a moving velocity of the spot is increased by the moving unit when the linear velocity detected by the linear velocity detection unit nears to the permissible linear velocity during the movement.

5. The optical disc apparatus according to Claim 2, further comprising:

a type distinction unit operable to distinguish a type of the optical disc to be an irradiation target of the optical beam; and

wherein the moving time control unit revises the permissible linear velocity according to the type of the optical disc determined by the type distinction unit.

6. The optical disc apparatus according to Claim 5,

wherein the moving unit makes the location profile

according to the type of the optical disc determined by the type distinction unit.

7. The optical disc apparatus according to Claim 5, further comprising:

a focus error output unit operable to output a focus error signal indicating a distance between a focus of the optical beam and the optical disc; and

wherein the type distinction unit distinguishes the type of the optical disc based on the focus error signal outputted by the focus error output unit.

8. The optical disc apparatus according to Claim 5,

wherein the type distinction unit identifies the optical beam output necessary for reading out information from the optical disc and determines the type of the optical disc based on a distinction result.

9. The optical disc apparatus according to Claim 2,

wherein the linear velocity detection unit detects the linear velocity based on a rotation velocity of the optical disc and the radius location of a spot on the optical disc.

10. The optical disc apparatus according to Claim 9,

wherein the linear velocity detection unit further detects the linear velocity based on moving velocity of the spot moved by the moving unit to the radius direction.

11. The optical disc apparatus according to Claim1,

wherein the moving time control unit changes a moving velocity of the spot by the moving unit so as to prevent the linear velocity from decreasing when the linear velocity detected by the

linear velocity detection unit nears to the permissible linear velocity.

12. The optical disc apparatus according to Claim 11,

wherein the rotation control unit makes the rotation unit increase a rotation velocity of the optical disc when the moving unit moves the spot from an outer radius to an inner radius of the optical disc, and

the moving time control unit makes the moving unit decrease the moving velocity of the spot when the linear velocity detected by the linear velocity detection unit nears to the permissible linear velocity during the movement.

13. The optical disc apparatus according to Claim 11,

wherein the rotation control unit makes the rotation unit decrease a rotation velocity of the optical disc when the moving unit moves the spot from an inner radius to an outer radius of the optical disc, and

the moving time control unit makes the moving unit increase the moving velocity of the spot when the linear velocity detected by the linear velocity detection unit nears to the permissible linear velocity during the movement.

14. The optical disc apparatus according to Claim 1,

wherein the moving unit changes a moving velocity of the spot along the radius direction of the optical disc according to a drive signal obtained from an outside, and

the moving time control unit changes the drive signal by applying an offset signal on the drive signal so as to prevent the linear velocity from decreasing when the linear velocity detected by the linear velocity detection unit nears to the permissible linear velocity.

15. The optical disc apparatus according to Claim 14,

wherein the rotation control unit makes the rotation unit increase a rotation velocity of the optical disc when the moving unit moves the spot from an outer radius to an inner radius of the optical disc, and

the moving time control unit applies an offset signal which makes it possible to decrease moving velocity of the spot by the moving unit when the linear velocity detected by the linear velocity detection unit nears to the permissible linear velocity during the movement.

16. The optical disc apparatus according to Claim 14,

wherein the rotation control unit makes the rotation unit decrease a rotation velocity of the optical disc when the moving unit moves the spot from an inner radius to an outer radius of the optical disc, and

the moving time control unit applies an offset signal which makes it possible to increase the moving velocity of the spot by the moving unit when the linear velocity detected by the linear velocity detection unit nears to the permissible linear velocity during the movement.

17. The optical disc apparatus according to Claim 1,

wherein the moving time control unit adjusts a rotation velocity of the optical disc by the rotation unit.

18. The optical disc apparatus according to Claim 17,

wherein the rotation unit obtains a drive signal outputted by the rotation control unit and changes the rotation velocity of the optical disc according to the drive signal, and

the moving time control unit amplifies the drive signal so as

to prevent the linear velocity from decreasing when the linear velocity detected by the linear velocity detection unit nears to the permissible linear velocity.

19. The optical disc apparatus according to Claim 17,

wherein the rotation unit obtains a drive signal outputted by the rotation control unit and changes the rotation velocity of the optical disc according to the drive signal, and

the moving time control unit applies an offset signal on the drive signal and changes the drive signal so as to prevent the linear velocity from decreasing when the linear velocity detected by the linear velocity detection unit nears to the permissible linear velocity.

20. The optical disc apparatus according to Claim 17,

wherein the moving time control unit makes the rotation unit transit the rotation velocity of the optical disc so as to make the rotation velocity of the optical disc faster than the rotation velocity corresponding to a target radius location at the time when the spot reaches to the target radius location of the spot when the moving unit moves the spot to the target radius location along the radius direction of the optical disc.

21. An optical disc apparatus for reading out information recorded on an optical disc by irradiating an optical beam on the optical disc, comprising:

a focus adjustment unit operable to adjust a focus of the optical beam so that the focus is formed on the optical disc;

a rotation unit operable to rotate the optical disc;

a moving unit operable to move a spot where the optical beam is irradiated on the optical disc to a radius direction of the optical disc;

a linear velocity detection unit operable to detect a linear velocity of the spot;

a rotation control unit operable to control the rotation unit so that the linear velocity detected by the linear velocity detection unit remains substantially constant on an arbitrary radius location on the optical disc when information recorded on the optical disc is read out; and

a focus adjustment stop unit operable to stop a focus adjustment made by the focus adjustment unit in the case where the linear velocity detected by the linear velocity detection unit decreases to a predetermined linear velocity or below, when the moving unit moves the spot.

22. An irradiation method for irradiating an optical beam on the optical disc, the optical beam being for reading out information recorded on an optical disc, comprising:

a rotation step in which a motor rotates the optical disc;

a moving step in which a traverse moves a spot on the optical disc irradiated with the optical beam to a radius direction of the optical disc;

a linear velocity detection step of detecting a linear velocity of the spot;

a rotation control step of controlling the motor so that the linear velocity detected in the linear velocity detection step remains substantially constant in an arbitrary radius location on the optical disc when information recorded on the optical disc is read out; and

a moving time control step of controlling at least one of the motor and the traverse so as to prevent the linear velocity detected in the linear velocity detection step from decreasing to a permissible linear velocity or below when the spot is moved by the traverse.

23. The irradiation method for the optical beam according to Claim 22,

wherein, in the moving time control step, a location profile showing a relation between a radius location and moving time corresponding to the movement is made, the traverse is controlled so that the spot moves along the location profile, and

the location profile is revised so as to prevent the linear velocity from decreasing when the linear velocity detected in the linear velocity detection step nears to the permissible linear velocity, and the traverse is controlled so that the spot is moved along a revised location profile.

24. The irradiation method for the optical beam according to Claim 23, further comprising:

a type determination step of determining the type of the optical disc to be an irradiation target of the optical beam;

wherein, in the moving time control step,

the permissible linear velocity is changed according to the type of the optical disc that is judged in the type determination step.

25. The irradiation method for the optical beam according to Claim 22,

wherein, in the moving time control step,

the rotation velocity of the optical disc by the motor is adjusted.

26. A program for making a computer execute an irradiation method for irradiating an optical beam on an optical disc, the optical beam being for reading out information recorded on the optical disc, comprising:

a rotation step in which a motor rotates the optical disc;

a moving step in which a traverse moves a spot on the optical disc irradiated by the optical beam to a radius direction of the optical disc;

a linear velocity detection step of detecting a linear velocity of the spot;

a rotation control step of controlling a motor so that the linear velocity detected in the linear velocity detection step remains substantially constant in an arbitrary radius location on the optical disc when information recorded on the optical disc is read out; and

a moving time control step of controlling at least one of the motor and the traverse so as to prevent the linear velocity detected in the linear velocity detection step from decreasing to a permissible linear velocity or below when the spot is moved by the traverse.

27. The program according to Claim 26,

wherein, in the moving time control step, a location profile showing a relation between a radius location and moving time corresponding to the movement, and the traverse is controlled so that the spot moves along a location profile, and

the location profile is revised so as to prevent the linear velocity from decreasing , and the traverse is controlled so that the spot moves along a revised location profile when the linear velocity detected in the linear velocity detection step nears to the permissible linear velocity.

28. The program according to Claim 27,

the irradiation program further comprising:

a type determination step of determining a type of the optical disc to be an irradiation target of the optical beam; and

wherein, in the moving time control step,

the permissible linear velocity is changed according to the type of the optical disc determined in the type determination step.

29. The program according to Claim 26,

wherein, in the moving time control step,

a rotation velocity of the optical disc by the motor is adjusted.